A Young Adult Patient with Septic Pulmonary Emboli of Undetermined Origin

MASAKO NAGAFUCHI, TAKEHARU KOGA, KAZUHITO TAGUCHI,
YOSHIRO NAGAFUCHI, MIKIKO HANADA, AKIRA TAKAGI,
HIROYOSHI MIZOTE* AND HISAMICHI AIZAWA

Department of Medicine, Kurume University School of Medicine, Kurume 830-0011
and *Chikugo City Hospital, Chikugo 833-0041, Japan

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Summary: A 25-year-old male who had no significant medical history presented abrupt onset of high-grade fever and chills without noticeable trigger. The patient sought for medical attention for subsequently developed dyspnea and chest pain. Radiological examinations revealed bilateral lung peripheral multiple opacities, some of which were cavitating, suggesting of septic pulmonary emboli (SPE). Isolation of *Staphylococcus aureus* in blood and sputum culture confirmed the diagnosis. Extensive examinations disclosed neither underlying immunocompromising conditions nor infectious foci, which are usually notable in patients with SPE. The present patient illustrates that there are patients with SPE in whom underlying conditions or infectious foci are difficult to determine, and that suspicion of the disease based on characteristic radiological findings is critical for appropriate management in those patients.

Key words septic pulmonary emboli, cavity, immunocompetent, underlying conditions

INTRODUCTION

Septic pulmonary embolism (SPE) is an uncommon disorder that presents fever and characteristic lung infiltrates with peculiar distribution. Since symptoms of the disease are often nonspecific at presentation, the diagnosis tends to be delayed. SPE usually affects individuals with underlying conditions, such as intravenous drug abuse [1], surgical operations of certain body areas, and cardiovascular diseases [2]. Medical procedures including immunosuppressive agents and indwelling catheters and devices [3] are likely to be associated with increasing number of patients with SPE. Therefore, identification of these underlying conditions is a critical clue to diagnose SPE adequately. Described is a notable case of SPE that occurred in a young adult male in whom neither underlying immunocompromising conditions nor potential infectious nidi could not be elucidated despite extensive examinations.

CASE REPORT

A 25-year-old male sought for medical attention because of high fever lasting for two weeks. He noticed the fever in conjunction with chills without noticeable prodromal symptoms. He denied particular medical histories. Familial histories were not particular. He smoked twenty cigarettes a day for 7 years, consumed alcohol occasionally, and denied drug abuse. He denied histories of needle puncture, dental treatment or injury for recent years. He visited another hospital where he was suspected to have common cold and was prescribed medication for it, however, pyrexia and chills persisted, and chest pain and dyspnea ensued. He was then referred to Chikugo City Hospital four days later when he complained of difficulty in breathing and chest pain. The patient admitted to the hospital on foot. Vital signs on presentation were: blood pressure, 116/70 mmHg; pulse rate, 98/min with a regular rhythm; body tem-

Correspondence to: Dr. Koga, Department of Medicine, Division of Respiriology, Neurology, and Rheumatology, Kurume University School of Medicine, 67 Asahi-machi, Kurume 830-0011, Japan. Tel: +81-942-31-7560 Fax: +81-942-31-7703 E-mail: kogat@med.kurume-u.ac.jp

Abbreviations: CT, computed tomography; SAB, *Staphylococcus aureus* bacteremia; SPE, septic pulmonary embolism.

perature, 37.8 °C; and respiration rate, 20/min. He had 165 cm height and weighted 83 kg. Skin was not remarkable. Oropharynx and cervix were not remarkable. Auscultation of the thorax revealed crackles at both lung bases. No cardiac murmur was audible. Laboratory values included: WBC, 23,200/ μ l with 89.1% neutrophils, 7.9% lymphocytes, and 2.8% monocytes; CRP, 24.8 mg/dl; slightly elevated liver enzymes; and normal renal function. The number of CD4 cells was 1411/ μ l (reference value: 344-1289/ μ l). HIV antibody was negative. Arterial blood gas determined under room air revealed: pH, 7.51; PaCO₂, 25.9 torr; PaO₂, 60.3 torr; HCO₃⁻, 20.5 mEq. A chest X-ray film revealed multiple irregular ill-defined opacities (Fig. 1) in both lung fields. Computed tomography (CT) of the thorax (Fig. 2) disclosed multiple round opacities with various size

Fig. 1. A chest radiograph shows multiple irregular ill-defined opacities in both lung fields (white arrows).

Fig. 2. Thoracic CT disclosed multiple round opacities along blood vessels, some of which cavitated (arrows), and were abutting to pleura (arrow heads).

ranging from 10 to 20 mm in diameter, along blood vessels. Some of which had cavitated and were abutting to pleura. These radiological features suggested PSE, and the diagnosis was confirmed by isolation of methicilline-sensitive *Staphylococcus aureus* in blood culture. Culture of sputum, which developed after the admission, also yielded *S. aureus*. The bacteria isolated from blood and sputum presented identical susceptibility pattern to a panel of antibiotics; sensitive to oxacillin, imipenem, gentamicin, clindamycin, minocycline, vancomycin and levofloxacin, and resistant to penicillin G. No other microbes were yielded. The patient was then examined by echocardiography and abdominal ultrasonography for infectious nidi, however, no potential lesion was disclosed. Re-examinations of oral cavity, neck and ears were not particular. The patient was treated with intravenous administration of cefepim, to which minocycline was added later, based on the *in vitro* sensitivity of the bacteria. Although the patient presented hemoptysis and bilateral pleural effusion requiring drainage during the treatment, the illness gradually ameliorated, and WBC and CRP decreased to 10,490/ μ l and 1.6 mg/dl, respectively, after one month of treatment.

DISCUSSION

Radiological findings and the results of the blood culture were critical in diagnosing the present case. *S. aureus* was isolated not only from blood but also sputum. Identical susceptibility pattern to a panel of antibiotics suggested the bacteria isolated from the different site as identical [4]. Radiological manifestations and the bacteria documented in sputum probably reflect a secondary involvement of the respiratory tract by the infection. Isolations of *S. aureus* in blood in association with systemic inflammatory response syndrome comprise a clinical entity known as *S. aureus* bacteremia (SAB). Community-acquired SAB reportedly accounts for 0.56 per 1000 admissions in a modernized area [4], more than half of which had no identifiable source of infection [5]. In this context, the present patient may represent a case of SAB complicating SPE, although the association of the two conditions has rarely been discussed in the literature.

SPE usually occurs in individuals with underlying conditions [6]. When it comes to SPE in young adults, Lemierre's syndrome is probably the most common condition [7]. In a series of patients with SPE, Lemierre's syndrome accounted for more than

half of the patients aged 30 years or younger [6], although culprit pathogen is usually *Fusobacterium* [7]. The present patient had neither history of upper respiratory infection nor noticeable infectious foci in the oropharynx or neck. Although periodontal disease is another possible origin for SPE [8], symptoms and examination denied it in the present patient. A similar case has been reported where tricuspid valve infective endocarditis was determined as the infectious nidi for SPE in a patient without underlying condition [9]. Heart sounds and echocardiography were not particular in the present patient. Utility of echocardiography in the diagnosis of endocarditis has been documented, however, sensitivity is estimated to be 65% [10], implying that rest of cases, including the present patient, can be overlooked by conventional echocardiography. Transesophageal echocardiography, which was declined by the present patient, has higher sensitivity, 90%, for detecting vegetation, although the procedure requires sedation and accompanies invasiveness [10]. The patient had normal value of immunoglobulins and complements (data not shown). Thus, as far as our search has reached, there were neither identifiable infectious nidi, nor underlying immunocompromising conditions in the present patient.

The diagnosis was based on typical radiological and bacteriological findings in the present case. Thoracic CT is probably the most useful radiological modality when SPE is suspected [11,12], since chest radiography alone may overlook lesions [11]. Iwasaki et al. [11] reviewed thoracic CT obtained from ten patients with SPE and regarded subpleural peripheral nodules and wedge-shaped peripheral lesions less than 30 mm in diameter as frequent findings. All of these features were all noted in the present patient, allowing us to consider SPE as a possible diagnosis. Clinical manifestations of SPE are often nonspecific [6], and the diagnosis can be delayed. In this context, suspicion based on characteristic radiological signs is critical in diagnosing SPE.

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